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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,694	07/16/2003	Aaditya Mahajan	TRQ-12957	1499
22888	7590	03/29/2006	EXAMINER	
BEVER HOFFMAN & HARMS, LLP TRI-VALLEY OFFICE 1432 CONCANNON BLVD., BLDG. G LIVERMORE, CA 94550			LEE, PATRICK J	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 03/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

BL

Office Action Summary	Application No. 10/621,694	Applicant(s) MAHAJAN ET AL.	
	Examiner Patrick J. Lee	Art Unit 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17, 19-27 and 29-33 is/are rejected.
- 7) ☒ Claim(s) 18 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This action is in response to amendment filed March 6, 2006.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-33 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The aspect of the substrate being undoped is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Nothing in the specification explicitly states or suggests that the substrate is undoped.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-16, 18-27, & 29-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,482,672 B1 to Hoffman et al.

With respect to claim 1, Hoffman et al disclose a semiconductor device comprising InGaAs layer (20) as an indium gallium arsenide absorption layer having an indium concentration of 68% (see column 5, lines 66-67). Hoffman also discloses InP substrate (22). While Hoffman does not explicitly state that the substrate (22) was undoped, such would have been obvious to one of ordinary skill in the art because buffer layers (24, 26) are disposed between InGaAs layer (20) and substrate (22) to allow for lattice matching, with the buffer layers grown undoped and the substrate being not conductive (see column 6, lines 49-50). To make the substrate undoped would have been obvious to one of ordinary skill in the art would allow for substrate (22) to match accordingly with the buffer layers (24, 26).

With respect to claim 2, the modified Hoffman et al disclose buffer layers (24, 26) to be lattice matched to the InGaAs layer (see column 6, lines 1-9).

With respect to claim 3, the modified Hoffman inherently discloses substrate (22) to have one lattice constant, while InGaAs layer (20) has another lattice constant. The modified Hoffman then discloses that buffer layers (24, 26) are to vary the lattice constant to match the substrate (22) and the InGaAs layer (20) (see column 6, lines 6-9).

With respect to claim 4, while the modified Hoffman does not explicitly disclose the photoconversion structure as such, such would be obvious to one of ordinary skill in the art because the modified Hoffman discloses the use of the device in an infrared light detection environment (see column 1, lines 15-22).

With respect to claims 5-7, the modified Hoffman does not disclose the ranges as specified, but such would have been obvious to one of ordinary skill in the art in order to obtain the appropriate bandgap in order to specifically detect the desired wavelength of light.

With respect to claim 8, the use of a p-type anode layer and an n-type cathode layer is not explicitly disclosed, but such would have been obvious to one of ordinary skill in the art in order to obtain a PIN diode structure capable of detecting the desired wavelength of light.

With respect to claim 9, the use of a reflective layer is not explicitly disclosed, but such would have been obvious to one of ordinary skill in the art in order to ensure that as much of the light is absorbed as possible.

With respect to claim 10, the modified Hoffman does not disclose a Gallium Arsenide substrate, but such would have been obvious to one of ordinary skill in the art because Gallium Arsenide would provide appropriate matching with the InGaAs layer. Also, while the metamorphic buffer layer is not explicitly disclosed to be InAlAs, such would have been obvious to one of ordinary skill in the art because such would also provide for appropriate matching of the detector layer with the substrate as the chemical properties are similar.

With respect to claim 11, Hoffman et al disclose a semiconductor device comprising InGaAs layer (20) as an indium gallium arsenide absorption layer having an indium concentration of 68% (see column 5, lines 66-67). Hoffman also discloses InP substrate (22). While Hoffman does not explicitly state that the substrate (22) was undoped, such would have been obvious to one of ordinary skill in the art because buffer layers (24, 26) are disposed between InGaAs layer (20) and substrate (22) to allow for lattice matching, with the buffer layers grown undoped and the substrate being not conductive (see column 6, lines 49-50). To make the substrate undoped would have been obvious to one of ordinary skill in the art would allow for substrate (22) to match accordingly with the buffer layers (24, 26). The use of a reflective layer is not explicitly disclosed, but such would have been obvious to one of ordinary skill in the art in order to ensure that as much of the light is absorbed as possible.

With respect to claims 12-14, the modified Hoffman does not disclose the ranges as specified, but such would have been obvious to one of ordinary skill in the art in order to obtain the appropriate bandgap in order to specifically detect the desired wavelength of light.

With respect to claim 15, the modified Hoffman et al disclose buffer layers (24, 26) to be lattice matched to the InGaAs layer (see column 6, lines 1-9).

With respect to claim 16, the modified Hoffman inherently discloses substrate (22) to have one lattice constant, while InGaAs layer (20) has another lattice constant. The modified Hoffman then discloses that buffer layers (24, 26) are to vary the lattice

constant to match the substrate (22) and the InGaAs layer (20) (see column 6, lines 6-9).

With respect to claim 18, the modified Hoffman discloses the buffer layers (24, 26) being formed on a second surface of substrate (22).

With respect to claim 19, the modified Hoffman does not explicitly disclose the thinning of a substrate, but such would have been obvious to one of ordinary skill in the art because such would allow for easier and cheaper manufacture. Also, the detection performance would be enhanced because more light would be able to be reflected back into the absorption layer and such would prevent loss of light.

With respect to claim 20, Hoffman et al disclose a semiconductor device comprising InGaAs layer (20) as an indium gallium arsenide absorption layer having an indium concentration of 68% (see column 5, lines 66-67). Hoffman also discloses InP substrate (22). While Hoffman does not explicitly state that the substrate (22) was undoped, such would have been obvious to one of ordinary skill in the art because buffer layers (24, 26) are disposed between InGaAs layer (20) and substrate (22) to allow for lattice matching, with the buffer layers grown undoped and the substrate being not conductive (see column 6, lines 49-50). To make the substrate undoped would have been obvious to one of ordinary skill in the art would allow for substrate (22) to match accordingly with the buffer layers (24, 26).

With respect to claims 21-24, the modified Hoffman does not disclose the indium concentration as specified, but such would have been obvious to one of ordinary skill in

the art in order to obtain the appropriate bandgap in order to specifically detect the desired wavelength of light.

With respect to claim 25, the modified Hoffman discloses: substrate layer (22) and metamorphic buffer layers (24, 26) such that the first surface is in contact with the photoconversion structure, while a second surface is in contact with the substrate. The modified Hoffman also discloses the lattice matching.

With respect to claim 26, the modified Hoffman inherently discloses substrate (22) to have one lattice constant, while InGaAs layer (20) has another lattice constant. The modified Hoffman then discloses that buffer layers (24, 26) are to vary the lattice constant to match the substrate (22) and the InGaAs layer (20) (see column 6, lines 6-9).

With respect to claim 27, the use of a p-type anode layer and an n-type cathode layer is not explicitly disclosed, but such would have been obvious to one of ordinary skill in the art in order to obtain a PIN diode structure capable of detecting the desired wavelength of light.

With respect to claim 29, the modified Hoffman does not disclose a Gallium Arsenide substrate, but such would have been obvious to one of ordinary skill in the art because Gallium Arsenide would provide appropriate matching with the InGaAs layer. Also, while the metamorphic buffer layer is not explicitly disclosed to be InAlAs, such would have been obvious to one of ordinary skill in the art because such would also provide for appropriate matching of the detector layer with the substrate as the chemical properties are similar.

With respect to claims 30 & 32-33, the modified Hoffman does not explicitly disclose the thicknesses of the layers as such, but such would have been obvious to one of ordinary skill in the art in order to appropriately allow for as much detection of light as possible.

With respect to claim 31, the use of a reflective layer is not explicitly disclosed, but such would have been obvious to one of ordinary skill in the art in order to ensure that as much of the light is absorbed as possible.

Allowable Subject Matter

7. Claims 17 & 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 17, the prior art of record does not disclose nor suggest the use of the temperature range and the infusion of the chemicals as stated.

With respect to claim 28, the prior art of record does not disclose nor suggest the use of an etch stop layer as claimed.

Response to Arguments

9. Applicant's arguments with respect to claims 1-33 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J. Lee whose telephone number is (571) 272-2440. The examiner can normally be reached on Monday through Friday, 8:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Patrick J. Lee
Examiner
Art Unit 2878

PJL
March 21, 2006



Stephone B. Allen
Primary Examiner